



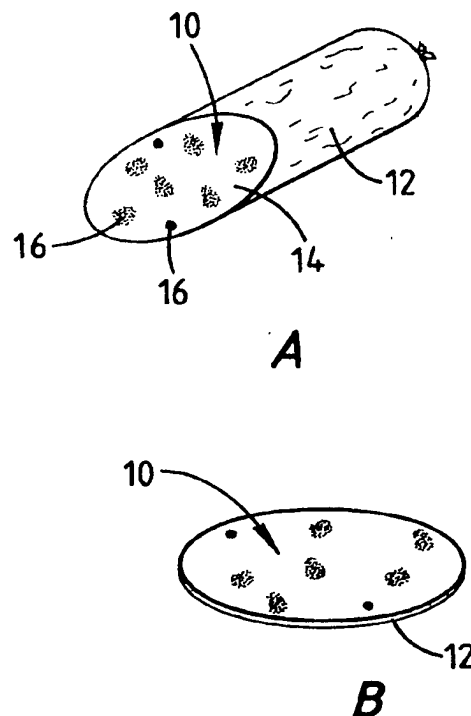
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(21) International Application Number: PCT/GB98/02999 (22) International Filing Date: 7 October 1998 (07.10.98) (30) Priority Data: 197 47 197.8 24 October 1997 (24.10.97) DE (71) Applicant (for all designated States except US): BERNARD MATTHEWS PLC [GB/GB]; Great Witchingham Hall, Great Witchingham, Norwich, Norfolk NR9 5QD (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): MATTHEWS, Bernard, Trevor [GB/GB]; Great Witchingham Hall, Great Witchingham, Norwich, Norfolk NR9 5QD (GB). JOLL, David, John [GB/GB]; Irmingland Hall, Corpusty, Norfolk NR11 6QF (GB). KOPPERS, Werner [DE/DE]; Metjendorfer Landstrasse 236, D-26215 Wiefelstede (DE). BÜSE, Friedrich [DE/DE]; Butjadinger Strasse 139, D-26215 Oldenburg (DE). (74) Agents: CRUMP, Julian, Richard, John et al.; fJ Cleveland, 40-43 Chancery Lane, London WC2A 1JQ (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: A NOVEL COOKED SAUSAGE AND A METHOD FOR MAKING THE SAME

(57) Abstract

A cooked sausage comprising a mixture of a meat emulsion and a mild yogurt, wherein the yogurt is substantially homogeneously dispersed through the meat emulsion and said mixture has a pH of about 5.5 or more. The water retaining capacity of the meat is thus retained, providing a sausage having desirable organoleptic qualities. Said mild yogurt may be prepared from milk mixtures by inoculation with slow working yogurt starter cultures.



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A Novel Cooked Sausage & A Method For Making The Same

The present invention relates to a novel cooked sausage and to a method for making the same. In particular, the invention relates to a cooked sausage
5 comprising meat and yogurt.

At the time of writing, there is a general consumer demand for meat and sausage products that are easier
10 to digest and contain fewer calories than traditional meat sausages. Previous attempts have been made to meet this demand by providing reduced fat sausages which are widely perceived by consumers to be healthier than the traditional variety. To this end,
15 sausages have been produced using meat that is as lean as possible. Poultry meat, for example, has been used increasingly in the production of sausages and other consumer meat products.

20 EP-A-0029503 (Stauffer Chemical Company Limited) discloses an improved fermented sausage which comprises meat and a cultured dairy product. The cultured dairy product, which is preferably derived from whey and used dry, is cultured using traditional
25 yogurt starter cultures comprising L. Bulgaricus and

S. Thermophilus until a final pH in the range of 4.2 to 4.3 is reached. On admixing the dairy product to a meat emulsion, a final product pH in the range of 4.5 to 4.8 is achieved, without requiring any further
5 fermentation of the meat product. After stuffing, the sausage is ripened, dried and/or smoked as required.

EP-A-0478526 (Vleeswarenfabrieken Imperial Naamloze Vennootschap) discloses a meat product, for example a
10 sausage, comprising meat and a dairy product, preferably curdled bactofugated milk, eg melted cheese or curd. EP-A-0478526 discloses that the dairy product is prepared by curdling the bactofugated milk using traditional cheese coagulating agents, such as
15 rennet ferment or other proteolytic enzymes from vegetable or microbial origin. The dairy product, on addition to the meat, has a pH in the range of 5.0 to 5.6. The mixture is then fermented further until a final pH of 4.6 to 5.2 is reached.

20

An object of the present invention is to provide a novel meat product. In particular, it is an object of the present invention to provide a novel cooked
sausage.

25

Another object of the present invention is to provide a cooked sausage that will be perceived by consumers to be healthy to eat, and which comprises fewer calories than traditional meat sausages.

5

Yet another object of the present invention is to provide an improved cooked sausage comprising meat and a dairy product.

10 According to one aspect of the present invention there is provided a cooked sausage comprising a mixture of a meat emulsion and a mild yogurt, wherein said yogurt is substantially homogeneously dispersed throughout the meat emulsion and said mixture has a pH of about
15 5.5 or more.

In a different aspect of the present invention, there is provided a method of making a cooked sausage which comprises forming a mixture of a meat emulsion and a
20 mild yogurt, in which mixture said yogurt is substantially homogeneously dispersed through the emulsion, forming the mixture into a sausage, and thereafter cooking the sausage; wherein the pH and proportion of the mild yogurt in the mixture is such
25 that the pH of the mixture is 5.5 or more.

Said meat emulsion may comprise red meat such, for example, as beef, lamb or pork, or poultry such, for example, as turkey or chicken. Such meat has a pH of about 6.0 to 6.2 and an isoelectric point of about pH 5.0 to about 5.2. In order to provide a boiled sausage that is juicy and has a desirable texture, it has been found that it is essential to keep the pH of the mixture of meat emulsion and partially fermented yogurt at pH 5.5 or more. If the pH of the mixture falls below pH 5.5 towards the isoelectric point of the meat, the water-retaining capacity of the meat is reduced, with the result that the juiciness and texture of the final product is impaired.

Normal yogurt has a pH of about 3.6 to 5.1, typically about 4.6. It will be appreciated therefore that if such yogurt is mixed with a meat emulsion, the pH of the resultant mixture may have a pH less than 5.5. According to the present invention, a mild yogurt is used which has a pH of 4.8 or more, preferably 5.2 or more. Such mild yogurt may comprise yogurt that is prepared in the traditional manner, but is used in the process of the invention before fermentation is fully completed. Thus, after inoculation of the milk mixture, the pH of the yogurt is monitored until it

reaches the desired volume. The mild yogurt is then made ready for use in the method of the present invention. In some embodiments, fermentation of the yogurt may be quenched by cooling the yogurt to a
5 temperature in the range of -2 to 6°C, preferably 0 to 6°C. Preferably, the yogurt is cooled rapidly using liquid nitrogen or a plato-heat-exchanger.

In order to assist in controlling accurately the pH of
10 the yogurt to be added to the meat emulsion, slow-working yogurt starter cultures are preferably used. Such slow working yogurt cultures may comprise Lactobacillus acidophilus, Bifidobacteria and Streptococcus thermophilus. Further, the yogurt is
15 preferably stirred continuously before use to allow accurate pH control.

In some embodiments, said mild yogurt may comprise an edible alkaline additive to neutralize the acidity of
20 the yogurt. Said alkaline additive may comprise, for example, carbonated soda. Phosphates could also be used to stabilize the mixture.

In some embodiments, the yogurt may be used in dried
25 or freeze dried form.

Said mixture may comprise 60 to 90% by weight of said meat emulsion.

- 5 Said mixture may comprise 10 to 40% by weight of the mild yogurt, preferably 15 to 30% by weight. Typically, the mixture may comprise about 24 to 26% by weight of the yogurt.
- 10 Said mixture may further comprise 0-10% by weight of various spices or other additives. In a particularly preferred embodiment of the invention, said mixture may comprise up to 10% of a pre-biotic additive such as a non-digestible carbohydrate. An example of a
- 15 pre-biotic carbohydrate is inulin. Said mixture may comprise 2-7% wt inulin, which selectively promotes the activity of some health-promoting bacteria in the colon.
- 20 Said mixture of meat and yogurt may be formed into sausages in any suitable manner to those skilled in the art, including moulding and extrusion. Preferably, the meat/yogurt mixture is extruded through a stuffing horn into a flexible sausage casing of the kind well
- 25 known to those skilled in the art. However, it is

also envisaged that the boiled sausage in accordance with the present invention may be formed by moulding and then forming a skin in situ by treating the surface of the sausage with a suitable acid so as to
5 cause coagulation of the surface layer of meat.

Said meat emulsion preferably comprises an emulsion of finely comminuted meat. Said meat emulsion may be formed by comminuting whole muscle, ground, minced or
10 mechanically separated meat. The meat may be used fresh or frozen. Said meat is preferably finely comminuted in the presence of said yogurt to form an emulsion having a soft, homogeneous consistency. In some embodiments the emulsion may further comprise
15 coarsely ground meat, which may be substantially uniformly dispersed through the emulsion.

Preferably, the yogurt is added to the meat during comminution in small portions or continuously, for
20 example, with the aid of pumping equipment. It is preferable to ensure that the pH of the yogurt/meat mixture does not fall below about pH 5.5, even transiently, during mixing of the yogurt with the meat. At the same time, it is preferable to ensure
25 that the pH of the yogurt is not increased too much by

the meat, such that the characteristic aroma of yogurt is lost.

An advantage of the present invention is that by
5 adding cooled yogurt at a temperature of 0 to 6°C to the meat emulsion, the normal addition of cooled water to meat emulsions for sausage manufacture can be reduced or dispensed with altogether. Such cooled water is normally added to maintain the temperature of
10 the emulsion below about 12°C during comminution and subsequent extrusion, and also to bind with the meat emulsion to cause the product to swell. Of course, yogurt contains a substantial proportion of water, and in accordance with the present invention, this water
15 can be used to replace the additional water that is normally added during sausage manufacture.

Preferably the meat is chilled prior to admixture of the mild yogurt to a temperature in the range 0 to 8°C.
20

Finally, the sausage is cooked. Said sausage may be boiled. By "boiled" here is meant heating the sausage in any suitable, edible fluid, preferably water, at a temperature and for a time sufficient to cook the
25 meat. In some embodiments the sausage may be steamed.

Preferably the sausage is boiled at a temperature in the range 60 to 80°C, more preferably in the range of 70 to 75°C, eg 72°C. Alternatively, the sausage may be cooked in hot air and/or hot smoke. Preferably, the
5 sausage is cooked at a sufficient temperature to kill the yogurt cultures, so as to prevent further fermentation of the yogurt in the finished product.

Thus, the present invention provides a novel cooked
10 sausage containing meat and yogurt and also a method for manufacturing this product. The cooked sausage of the invention is relatively high in protein, but contains reduced fat as compared with a conventional meat sausage. The yogurt adds a distinctive flavour
15 and aroma to the product which is characteristic of yogurt. The pH of the yogurt when added to the meat emulsion is sufficient low that the yogurt has the characteristic flavour and aroma of normal yogurt, but is not so low as to reduce the pH of the meat/yogurt
20 mixture below about pH 5.5, so that the emulsion retains its water binding properties to ensure that a sausage is produced that is desirably juicy and has attractive organoleptic quality.

25 Following is a description by way of example only with

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reference to the accompanying drawings of methods occurred in the present invention into effect. In the drawings:-

5 Figure 1A is a schematic, isometric view of a cooked sausage in accordance with the present invention.

Figure 1B is a schematic, isometric view of a slice of a cooked sausage in accordance with the present
10 invention.

Figure 2 shows a flow diagram for manufacturing a boiled sausage in accordance with the invention.

15 With reference to Figures 1A and 1B, a boiled sausage in accordance with the invention has a normal sausage shape and comprises an edible sausage material 10 that is stuffed into a conventional sausage casing 12. Said sausage material 10 comprises a finely comminuted
20 meat emulsion 14 and a coarse component 16 that is substantially uniformly dispersed through the emulsion 14. Said coarse component comprises coarsely ground pieces of meat and optional seasonings such, for example, as whole or coarsely ground peppercorns. In
25 some embodiments, the coarse portion may be omitted.

Said finely comminuted meat emulsion 14 comprises a mixture of meat and yogurt which are substantially homogeneously blended together to form an emulsion. The meat pieces of the coarse component 16 may also be
5 tumbled with yogurt.

The yogurt is manufactured in the traditional way using milk that is clarified and separated into cream and skimmed milk, and then standardised to achieve a
10 desired fat content. The desired proportions of cream and skimmed milk are then blended together, and the mixture is pasteurised and then homogenised. The homogenised mixture is cooled to a temperature in the range of about 30 to about 50°C and then inoculated
15 with a slow working yogurt starter culture comprising Streptococcus thermophilus, Lactobacillus acidophilus and Bifidobacteria. The mixture is then allowed to ferment for about four to six hours at 30 to 50°C, typically about 43°C, such that the mixture coagulates
20 to form yogurt. The pH of the mixture is carefully monitored. When the pH of the yogurt reaches a target pH of about 5.1 to 5.2, the yogurt is stirred to allow accurate determination of the pH. Such stirring also has the effect of an arresting fermentation. When a
25 target pH of 4.8 or more is reached, the yogurt is

12

subjected to shock freezing to a temperature of about -1°C. At this temperature, further fermentation of the yogurt is prevented. For such shock freezing, liquid nitrogen or a plate-heat-exchanger may be used.

5

In view of the need to control accurately the pH of the yogurt used in the process of the invention, it is desirable that the yogurt is made at the same site as sausage manufacture takes place, but it is envisaged that alternatively yogurt supplied from a nearby dairy may be used.

10

The chilled yogurt is then divided into two separate portions. A first portion is weighed for addition to the coarse component 16 of the sausage material 10. At the weighing stage, additional spices and/or additives may be added to the yogurt. Said coarse component is then tumbled with the yogurt for about two hours and is then ground.

15

20

A second portion of the yogurt is added in small batches to minced meat having a temperature of about 0°C. Said minced meat is finely comminuted with the yogurt to form an emulsion, and the yogurt assists in maintaining the temperature of the meat emulsion below

25

about 12°C. Additional spices or additives may be added to the meat emulsion during comminution.

The coarse component is then mixed with the comminuted meat emulsion, such that the coarse component is substantially uniformly dispersed throughout the finely comminuted meat emulsion. The mixture is then stuffed into sausage casings using a stuffing horn of the kind well known to those skilled in the art. The resulting sausages are boiled at a temperature of about 72°C in the water and then showered, cooled, packed and labelled in the conventional manner.

The total amount of yogurt added to the sausage material is calculated such that the overall pH of the sausage material does not fall below about pH 5.5. In this way, the sausage material retains its ability to bind water, so that a desirable juicy product is produced. At the same time, the yogurt having a target pH of about 4.8 or more has an acceptable yogurt flavour and aroma.

Example 1

A specific example of a turkey putenjagdwurst with yogurt that can be made using the process described

14

above has the following recipe:-

Finely Comminuted Meat Emulsion

	Turkey thigh meat	10.0%
5	Turkey white trim	20.5%
	Turkey dark trim	20.5%
	Chicken trim	14.2%
	Yogurt	25.1%
	Spices	9.7%
10		100%

Dry Ingredients for Meat Emulsion

	I. Curing salt	1.39%
	sodium citric	0.56%
15	II. Ground mustard seed	0.8%
	lactose	0.6%
	III. Super Pök (ascorbate, sugar)	0.25%
	Senator (spicemix Raps)	0.57%

15

	Green Pepper (Raps)	0.16%
	Glutalin (Raps) (flavourenhancer)	0.19%
	HVP (hydrolysed vegetable protein)	0.19%
	IV. Inulin (Frutafit)	4.9%
5	V. Liquid onion (Raps)	0.09%
	liquid garlic (Raps)	0.03%
		9.73%

Coarse Component

10	Turkey thigh meat	66.2%
	Yogurt	24.8%
	Spices	9.0%
		100%

15 The coarse component is ground through a 13mm plate.

Spices for Coarse Component

	I. Curing salt	1.85%
	sodium citric	0.56%
20	II. Inulin (Frutafit)	3.1%

	III. Super Pök (ascorbate, sugar)	0.12%
	Green Pepper (Raps)	0.12%
	Glutalin (Raps)	0.26%
5	IV. Spice-mix Schinkenwurstgewürz (Wolf)	0.70%
	Senator (Raps)	0.44%
	V. Garlic, liquid (Raps)	0.22%
10	fresh onion, liquid (Raps)	0.27%
	VI. Green pepper corns	1.35%
		8.99%

15 At the final mixing stage, 53% by weight of the
 comminuted meat emulsion was mixed with 43% wt of the
 coarse component.

Example 2

20 A specific example of a pork meat putenjagdwurst with
 yogurt can be prepared using the method described

17

above is as follows:-

Finely Comminuted Meat Emulsion

	Lean pork trimmings	32.1%
5	Pork shin meat	20.5%
	Pork neck fat	15.2%
	Yogurt	25.1%
	Spices	7.1%
		100%

10

The emulsion is made in a bowl-chopper. Yogurt is added in small quantities.

Dry Ingredients for Emulsion

15	I. Curing salt	1.39%
	sodium citric	0.56%
	II. Ground mustard seed	2.72%
	lactose	0.9%
	III. Super Pök	0.25%
20	(ascorbate, sugar)	

	Senator (Spicemix Raps)	0.56%
	Green Pepper (Raps)	0.16%
	glutalin (raps) (flavour enhancer)	0.19%
	HVP (hydrolysed vegetable protein)	0.19%
5	IV. liquid onion (Raps)	0.09%
	liquid garlic (Raps)	0.03%
		7.04%

Coarse Meat Component

10	Pork shoulder 90VL	67.9%
	Yogurt	24.8%
	Spices	7.3%
		100%

15 The coarse component is ground through a 13mm plate.

Spices for Coarse Component

	I. Curing salt	1.85%
	sodium citric	0.56%
20	II. lactose	0.5%

	ground mustard seed	0.98%
	III. Super Pök (ascorbate, sugar)	0.12%
	Green Pepper (Raps)	0.12%
5	Glutalin (Raps)	0.26%
	IV. Spicemix Schinkenwurstgewürz (Wolf)	0.70%
	Senator (Raps)	0.44%
10	V. Garlic, liquid (Raps)	0.22%
	fresh onion, liquid (Raps)	0.27%
	VI. Green pepper corns	1.35%
		7.30%

- 15 At the final mixing stage, 57% by weight of the finely comminuted pork meat emulsion is mixed with 43% weight of the coarse meat portion.

CLAIMS

1. A cooked sausage comprising a mixture of a meat
5 emulsion and a mild yogurt, wherein said yogurt is
substantially homogeneously dispersed through the meat
emulsion and said mixture has a pH of about 5.5 or more.
2. A cooked sausage as claimed in claim 1 wherein said
10 mild yogurt has a pH of 4.8 or more.
3. A cooked sausage as claimed in claim 1 or claim 2
wherein said mixture comprises 60 to 90% wt of said meat
emulsion.
- 15 4. A cooked sausage as claimed in claim 1, claim 2 or
claim 3 wherein said mixture comprises 10 to 40% by
weight of the mild yogurt.
- 20 5. A cooked sausage as claimed in any preceding claim,
wherein said mixture further comprises up to 10% by
weight of various spices or other additives.
6. A cooked sausage as claimed in claim 5 wherein said
25 mixture comprises up to 10% of a prebiotic additive.

7. A cooked sausage as claimed in claim 6, wherein said prebiotic additive is inulin.

8. A cooked sausage as claimed in any preceding claim
5 wherein said meat emulsion comprises red meat or poultry.

9. A method of making a cooked sausage which comprises forming a mixture of a meat emulsion and mild yogurt, in which mixture said yogurt is substantially homogeneously
10 dispersed through the emulsion, forming the mixture into a sausage, and thereafter cooking the sausage; wherein the pH and proportion of the mild yogurt in the mixture is such that the pH of the mixture is 5.5 or more.

15 10. A method as claimed in claim 9 wherein said mild yogurt has a pH of 4.8 or more.

11. A method as claimed in claim 9 or claim 10 wherein said mild yogurt is prepared by inoculating a milk
20 mixture, monitoring the pH of the yogurt, and quenching fermentation of the yogurt when the pH reaches a desired value.

12. A method as claimed in claim 11 wherein fermentation
25 of the yogurt is quenched by cooling the yogurt to a

temperature in the range -2 to 6°C.

13. A method as claimed in claim 11 or 12 wherein said yogurt starter culture comprises a slow working yogurt
5 culture.

14. A method as claimed in any of claims 9 to 13, wherein the mixture of meat and yogurt is formed into a sausage by extrusion through a stuffing horn into a
10 flexible casing.

15. A method as claimed in any of claims 9 to 14 wherein said meat emulsion comprises an emulsion of finely comminuted meat and is formed by comminuting whole
15 muscle, ground, minced or mechanically separated meat in the presence of said yogurt.

16. A method as claimed in claim 15 wherein said yogurt is added to the meat at a temperature of 0 to 6°C.

20

17. A method as claimed in claim 15 or 16 wherein said meat has a temperature prior to comminution of 0 to 8°C.

18. A method as claimed in any of claims 9 to 17 wherein
25 the sausage is cooked by heating in an edible fluid.

19. A method as claimed in any of claims 9 to 18 wherein the sausage is cooked by boiling in water at a temperature in the range 60 to 80°C.

- 5 20. A method as claimed in any of claims 9 to 18 wherein said sausage is cooked in hot air and/or hot smoke.

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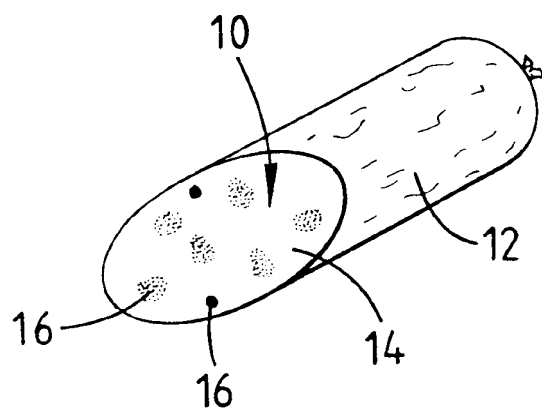


FIG. 1A

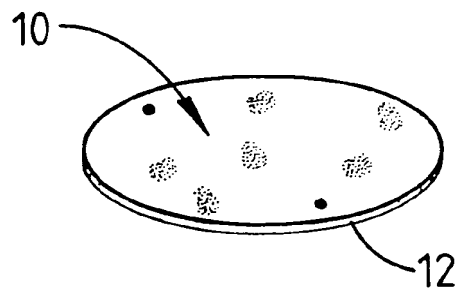


FIG. 1B

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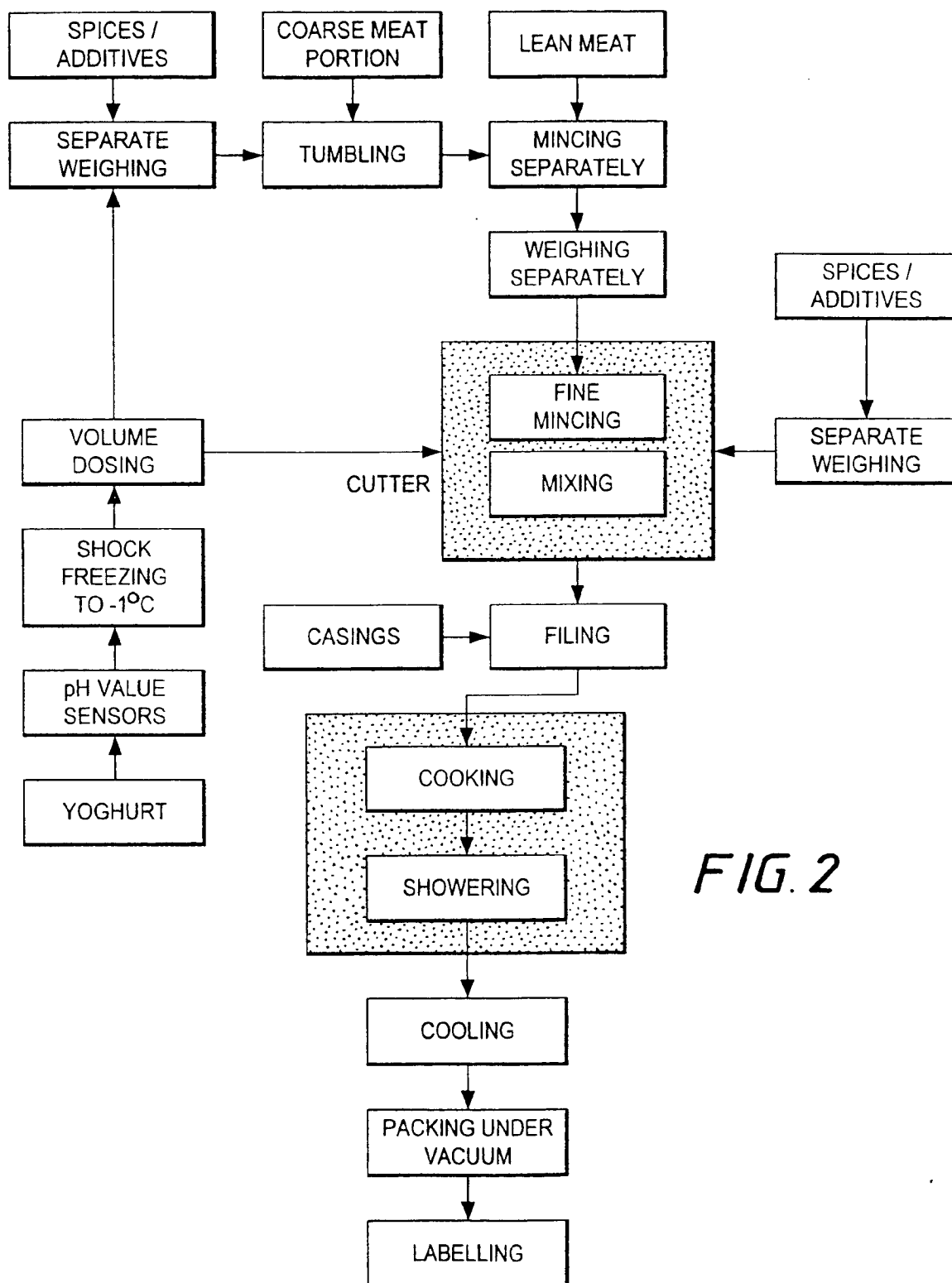


FIG. 2

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 98/02999

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23L1/314

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 029 503 A (STAUFFER CHEMICAL COMPANY) 3 June 1981 cited in the application ---	1
A	EP 0 478 526 A (VLEESWARENFABRIEKEN IMPERIAL NAAMLOZE VENNOOTSCHAP) 1 April 1992 cited in the application ---	1
A	US 4 492 712 A (CASELLAMLINDA J.) 8 January 1985 see column 6, line 19-27 see column 7, line 47; claim 1 -----	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/02999

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